New Bus for London
Invitation to Tender - PRO1632
Section 5 - Specification
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New Bus for London
Invitation to Negotiate - PRO1632
Section 5 - Specification

Introduction

This document comprises the technical specification for the Vehicle for the purposes of the Invitation to Negotiate. The specification is generally driven by performance outputs rather than by specifying the solution to achieving those outputs.

Whilst the high level requirements are stated it is accepted that there will be some evolution during the course of the Contract as the detailed design work is undertaken.

It is not expected that the Bidder will have developed the full and final design during the course of the procurement process.

The Specification must be read in conjunction with all other tender documentation, but for the avoidance of doubt, the Contract takes precedence. The final form of the Specification will be Schedule 1 to the Contract.

A glossary of terms relating to the Specification is given in 29.00.

Bidders should satisfy themselves that they have access to all the relevant regulatory, legislative and technical reference documentation.

Instructions to Bidders

The Specification is laid out both as a reference document and as a response document. Bidders shall use the electronic version of this document (available via the TfL Bravo procurement portal) to make their response to the Invitation to Negotiate by completing columns e - g as appropriate.

Legend

Column ref.

a This is the unique Specification reference number

b This is a description of the category of the Specification requirement

c This column contains the general description of the actual requirements, normally stated as a performance objective

d This column indicates the compliance category of the Specification requirement.
- ***I*** - The item described in column c is Indicative or is provided for Information only.
- ***M*** - The requirement is Mandatory for compliance with the Specification
- ***D*** - The requirement is Desirable

e Bidders are required to indicate whether or not their response is compliant with the Mandatory elements of each of the requirements

f Bidders are required to provide a short statement indicating and providing evidence as to how the requirements have been met, or to provide a justification as to the reasons why they are not being met and the performance levels they expect to achieve. Alternative proposals may be indicated here.

g Bidders are required to make specific reference here to the precise location (eg section, paragraph, page number, drawing sheet etc) within their submission to where the full technical response is contained.

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a	b	c	d	e	f	g
1.00	**Scope**					
1.01	General	The New Bus for London is priority project for the Mayor of London. The overall guiding requirements for the Vehicle are as follows: - the Vehicle shall have an iconic design and have a unique look and feel. - the fuel economy performance shall be at least as good as that demonstrated by the best-of-breed hybrid systems currently being developed (2009) - there shall be an open platform - the open platform shall be capable of being closed off - the bus shall be configurable to operate in one-person and two-person crew modes. A Prototype Vehicle shall be delivered and put into trial running in 2011, and an initial batch of Production Vehicles shall be delivered and in operation before the end of April 2012.	***I***			
1.02	Design and manufacturing expectations	The Contractor shall prioritise weight reduction measures and techniques throughout the design and manufacturing process in order to maximise fuel economy performance, and minimise emissions and environmental impact. The Contractor shall utilise innovations in materials, systems and processes throughout the design and manufacturing processes, and be expected to redeploy these across their product ranges. This however shall not preclude the use wherever practicable of standard and commonly sourced functional components and sub-assemblies where appropriate. The Contractor shall employ quality management systems to ensure the highest levels of quality assurance are achieved. The Contractor shall meet the minimum legislative requirements for sustainability and Vehicle disposal. The Vehicle shall be designed and constructed to meet the requirements of the Bus Directive, to be fit for purpose and be economic in its cost to operate. The Vehicle shall achieve a minimum operational life of 14 years.	***M***			

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1.03	Operational duties	The Vehicle shall be suitable for large city operation and incorporate the specific requirements of central London operation. The Vehicle shall be capable of high frequency, long running, fully passenger laden PSV operational schedules, undertaken in adverse traffic conditions (eg slow moving, frequent start-stop). The Vehicle will be expected to operate continuously for at least 18 hours per day without returning to its depot for refuelling or servicing, covering a minimum average of 250km during that duty cycle with an average operational speed of between 10-20kmh, for 7 days per week, and for 364 days per year. The maximum expected operational life of the Vehicle under the Company's duties is 14 years.	***M***			
1.04	Whole life cost	The Contractor shall provide a whole life cost schedule for the Vehicle based on a range of factors including but not limited to: - the unit cost of the Vehicle - the residual value of the Vehicle - the maximum operational duties described in Specification 1.03 (including fuel, oils, and usage of other consumables) - the maximum operational life for the Company as described in Specification 1.02 - the proposed cost of the maintenance regime (including planned preventative and corrective work, replacement parts, routine servicing and cleaning, periodic deep cleaning etc) - refurbishment cycles (see Specification 20.03) - typical accident damage repairs The whole life cost shall exclude tyre, driver and crew costs. The whole life costs shall be considered in two stages for both 1) an initial 5 year period (one route contract term) and 2) a second 9 year period (reflecting a maximum 14 year life), and shall be incorporated in the relevant table in Section 3 of the Invitation to Negotiate	***M***			
1.05	Crew	The Vehicle shall be capable of operation both with one crew member (ie driver) and with two crew members (ie driver plus second crew member).	***M***			
1.06	Ticketing regime	The standard Transport for London (TfL) ticketing and fare validation regime shall be deployed. Remote Oyster card readers to be provided at all entrances and vestibules (see Specification 15.01).	***M***			

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2.00	**Styling**					
2.01	Styling	The Vehicle shall have unique and iconic styling both externally and internally. There shall be an overall common styling theme that pervades all key features of the Vehicle. The Contractor shall provide details of partnerships or engagements with specialist vehicle styling consultants, or state if none are being considered. The final proposal for the essential "look and feel" of the Vehicle is not expected to have been completed during the Bidding stage.	***M***			
2.02	Design material	The Contractor will be provided royalty free (for the purposes of the tender exercise) with all of the winning design submissions that were part of the Company's Design Competition run in 2008. The Contractor is encouraged to fully utilise this resource in their proposals, and this data forms part of the Company's "Background Intellectual Property" for the purposes of the Contract. This material is provided in Section 6 of the Invitation to Negotiate.	***I***			

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3.00	**Environmental**					
3.01	Sustainability plan	The Contractor shall have and implement a sustainability plan that demonstrates how they will reduce the adverse environmental impact over the life-cycle of the Vehicle. CO2 emissions, air quality, water consumption and waste should be considered and minimised during the manufacturing, use and disposal of the Vehicle. The Contractor shall comply with the End of Life Vehicle (ELV) Directive and, in addition, achieve recycling rates of 95% of the Vehicle weight.	***M***			
3.02	Emissions	The Vehicle shall have emissions which are significantly lower than an equivalent conventional diesel engined bus, demonstrated over Transport for London's standard test cycle (also known as the TfL MLTB drive cycle). Details of the test cycle are available on request. The target emissions standards (based on a diesel engined hybrid) are as follows: HC (g/km) 0.015 CO (g/km) 0.040 NOx (g/km) 7.500 PM (g/km) 0.030 (range of ultra fines to be balanced) CO2 (g/km) 735 Bidders should state their expected emissions profile, with fuel type if not diesel EN590 and demonstrate their method of predicting the emissions profile.	***M***			
3.03	Noise	The Vehicle shall be required to have a drive-by test result of 72dB(A). A supplementary TfL drive-by test which includes acceleration conditions and ancillary equipment to be operating shall also be undertaken. This test has a range of targets for both interior and exterior noise. The Contractor will be required to quantify their results utilising the current TfL test procedures. Details of these tests are available on request. Noise frequency from any equipment shall avoid low frequency bands in the range that can cause disturbance to some passengers and other nearby members of the public who have a particular sensitivity to these frequencies.	***M***			

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4.00	**Accessibility**					
4.01	General	Accessibility levels must meet or exceed minimum requirements of the Public Service Vehicle Accessibility Regulations 2000 (PSVAR) and Disability Discrimination Act 2005 (DDA). Layouts and features must be extensively trialled, tested and demonstrated to the Company and with representatives of key user groups as part of the Quality Plan (see Specification 21.02).	***M***			
4.02	Wheelchair space	One wheelchair space of minimum length 1600mm shall be provided as near as practicable to the central entrance on the offside of the Vehicle. The space shall be configured so that it can also be used by buggies if not occupied by a wheelchair. The final proposed layout will be subject to approval by the Company.	***M***			
4.03	Wheelchair ramp	The Vehicles shall be fitted with a powered driver-operated wheelchair access ramp at the centre door. The ramp must be installed with the manoeuvring area monitored by close circuit television displayed on the driver's compartment monitor when doors are open • The ramp must be designed to maximise the protection of the ramp from damage and specific attention should be given to its installation to improve operational reliability. • The Vehicle must be fitted with ramp deployment audible warning device at the centre doors, with a beeping sound and not to exceed 75db(A), when measured at 1.25m height from the exterior ground on centre line of the exit door at a distance of 1.5m. □ Access ramps must function on all kerb surfaces likely to be encountered on London streets. □ The ramp forward edge is to be recessed at the centre door from the main bodywork exterior by at least 35mm. The area between the lower edge of the closed door leaf and the floor should be protected against water or any other form of material ingress.	***M***			
4.04	Induction loops	Induction loops (T band) must be provided to interface with the PA and iBus systems.	***M***			
4.05	Colour contrasts	The Vehicle shall be designed with DDA and PSVAR compliant colour contrasts for handrails, glazing manifestations, step thresholds and other features. The final proposed arrangements will be subject to approval by the company.	***M***			
4.06	Other provisions	Step heights and thresholds must meet the required standards in the PSVAR and DDA.	***M***			

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5.00	**Dimensions**					
5.01	Primary dimensions	The following indicative dimensions are provided by way of guidelines: Maximum dimensions: Length: 11,000mm Width: 2,550mm Height: maximum permitted height for operational duties in London Minimum dimensions: Length: 10,000mm Width: 2,550mm Height: the minimum height will be derived from the internal headroom requirements given in Specification 5.02 The Company will consider designs that are outside these guidelines.	***D***			
5.02	Other dimensions	Height: minimum 1,800mm internal headroom to be achieved on each deck. Max height to be provided at entrances and at open platform. A low-bridge design is not required. Two wheel-base options will be considered. The Contractor shall optimise the Vehicle dimensions to maximise the seating and passenger capacity within dimensions available. The Vehicle shall be designed with approach and departure angles of between 7 and 8 degrees. The design shall state what angles will be achieved with DDA compliant step heights.	***M***			
5.02	Turning circle/swept path	The turning circle shall be no worse than the current worse case London specification double-deck. The Contractor shall provide drawings showing the proposed swept path of the Vehicle.	***M***			

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6.00	**Passenger compartments**					
6.01	Passenger capacity	The total overall passenger capacity (including standees) shall be a minimum of 87. Passenger weight shall be based on 68kg per person.	***M***			
6.02	Seated capacity	Lower saloon seating - minimum 22 seated but maximised subject to seat pitches given in Specification 6.04. Upper saloon - minimum 41 seated but maximised subject to seat pitches given in Specification 6.04.	***M***			
6.03	Standing capacity	Standees shall only be accommodated in the lower saloon: a minimum of 24 standees shall be accommodated. The immediate area of the open platform shall not be included in the space available for standees.	***M***			
6.04	Seating	All seats shall have individual cushions and seat backs and shall provide a high level of comfort and support. The Contractor shall maximise the number of forward facing seats. There shall be no tip-up seats provided. Minimum width 440mm (measured on cushion) Minimum pitch at 800mm wherever possible The final approved height of the seat cushion shall be subject to a review of user acceptance trails. The final layouts shall be subject to a specific approval by the Company, including a review of the horizontal seating alignment. No high backseats, headrests or armrests shall be provided. Inward facing seats may be considered if they enhance the layout of the rear platform area. The provision of seat perches is acceptable in addition to minimum numbers of full seats provided.	***M***			
6.05	Priority seats	The Vehicle shall be designed with a minimum of 4 Priority Seats, which shall be provided on the low flat level floor area. In addition, a further 4 seats to a similar standard, designated "preferential seating", shall be provided in this area.	***M***			

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6.06	Low flat near-level floor	The Vehicle shall be designed to have a low flat near-level floor throughout in the lower saloon for all passenger movement areas and the floor space shall be optimised subject to minimum required space for electrical and mechanical equipment compartments. A minimum number of 8 seats to be provided on this area. Maximum transverse (ie cross Vehicle) slopes to be compliant with requirements of DDA. Maximum longitudinal slopes to be stated and justified.	***M***			
6.07	Lighting	The Vehicle shall be provided with interior lighting using LED lamps or equivalent low energy equipment that provides a high quality ambience in the passenger saloons using a mix of direct and indirect lighting techniques, with enhanced illumination for specific passenger movement and circulation areas. The following minimum lighting intensity levels shall be provided: Lower deck 270 Lux Upper deck 180 Lux Staircase areas 200 Lux The Vehicle shall be provided with smart sensors to ensure the interior lighting is automatically de-activated in daylight.	***M***			

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6.08	Handrails	The Vehicle shall incorporate passenger handrails and poles as specified below: a) All handrails and stanchions to be 35mm diameter smooth tube with powder coating or nylon dipped matt crackle finish. b) A longitudinal waist height handrail is required, to provide a continuous passenger waist height hand grip support from the entrance / cab area to the beginning of the seated area or staircase steps. c) Low level hand poles integrated into seat structure to be provided on lower deck. d) Door or door partition handrails positioned to assist boarding and alighting must be fitted at all entrance and exit points. e) Seat-back to ceiling handrails (with bell push) are required at all forward facing seats on lower saloon and alternate seats on upper saloon. f) All bell push buttons to be coloured red with contrasting surrounds. g) Where horizontal hand rails are fitted in standing areas, bell pushes must be placed in a position so as to limit the risk of accidental activation by passengers leaning on them. h) Horizontal rails above wheel chair and / or standing area to be fitted with hanging grab hand holds of the none solid type. These grab hand holds should only be used in the low floor area and must not be placed in entrance / exit areas. i) A floor to ceiling hand pole is required in the open rear platform area. In addition handrails shall be provided on the interior bulkhead and interior of the rear bodywork of the open platform area to assist boarding and lighting. The handrails and pole shall not be visible or useable from the exterior when the rear platform is closed off (see Section 9.00).	***D***			
6.09	Public address equipment	To provided as part of the iBus equipment. See Specification 16.01.	***M***			

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6.10	Interior noise levels - general	The Vehicle shall be designed to provide a comfortable passenger experience and special attention shall be given to ensuring the passenger compartments are as quiet as practicable. Body panels and interiors fittings shall be secured so as not to produce rattles or other noise emissions across all harmonics.	*M*			
6.11	Interior noise performance targets	As a general guideline maximum interior noise levels generated by the Vehicle shall not exceed the following: • When driving at constant 16 kph for 2 minutes on straight road □ Measured at 1m height, on centreline of vehicle on front axle and rear axle datum, no more than shown Lower Saloon Upper Saloon Front Axle 61 dB(A) 53 dB(A) Rear Axle 64 dB(A) 54 dB(A) • When driving at constant 40 kph for 2 minutes on straight road □ Measured at 1m height, on centreline of vehicle on front axle and rear axle datum, no more than shown Lower Saloon Upper Saloon Front Axle 68 dB(A) 60 dB(A) Rear Axle 70 dB(A) 60 dB(A)	*M*			

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7.00	**Mechanical, engine systems, drive train**					
7.01	Fuel economy	The Vehicle shall achieve a minimum diesel equivalent economy of 28 litres/100 km (when using EN590 diesel) when measured against the TfL MLTB test cycle. Details of the test cycle are available on request. Endurance and range shall be compatible with the operational duty cycles described in Specification 1.02.	***M***			
7.02	Performance profile	The Vehicle shall be designed to deliver a maximum acceleration rate not exceeding 1.6m/s/s and minimum of 1.4m/s/s. Maximum acceleration rates shall achieved gradually. Driver performance management systems, and automatic engine start-stop or engine shutdown on idle systems are encouraged.	***M***			
7.03	Engine	Alternative fuels and zero emission options (within capital cost constraints) will be considered with energy consumption to be compared with regular diesel fuel. Fuel type based on diesel specification EN590. Any alternative fuels or standards shall be declared.	***I***			
7.04	Transmission	The Vehicle shall be designed with a transmission system that delivers a very smooth power deliver, such that any changes in gearing are virtually imperceptible by customers.	***M***			

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7.05	Suspension	The suspension system shall deliver a high quality ride, equivalent to that achieved by a 4 or 6 airbag-type system. A full near-side kneeling suspension shall be provided for a maximum first step height at all passenger entrances/exits at least as low as required by the relevant Vehicle regulations and standards. The kneeling operation shall be automatic and simultaneous with door operation. A full squat kneeling function shall be provided for use when the wheelchair ramp is deployed.	***M***			
7.06	Electrical system	Ancillary electrical systems shall be adequate for all lighting, iBus, ticketing equipment and other passenger systems requirements.	***M***			
7.07	Fuelling system/capacity	The fuel tank (or energy storage) capacity shall be sufficient to meet the operational requirements given in Specification 1.02 plus a minimum of 10%. Options for the re-fuelling system will be allowed as required by Vehicle Operators	***M***			

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8.00	**Entrances**					
8.01	Minimum requirements	The Vehicle shall be designed with three passenger entrances: Front entrance: A power-operated service door of minimum clear width 1200mm Centre entrance: A power-operated service door of minimum clear width 1200mm Rear entrance: see Specification 9.00 Front entrance to be inward glider type, flush fitting when closed and one piece full depth glass in each door leaf for maximum driver view of kerb side. Centre entrance to be outward slider type and flush fitting to the body side when closed. Door header panels must provide adequate prevention against finger ingress to the door operation mechanism Door or door partition handrails positioned to assist boarding and alighting must be fitted at all entrance and exit points The emergency door controls fitted to entrance and exit doors must be disabled automatically by way of an interlock, when the vehicle is travelling at speeds above 5kph. Overhead suitable illumination, on doors opening must be provided at minimum Lux levels as stated in Specification 6.07. Door closing-only audible warning device on all exit doors, to be of beeping sound and not to exceed 75dB(A), when measured at 1m height from floor on centre line of vehicle and exit door □ Broad band noise type will also be considered □ Voice or other tones are not acceptable.	***M***			
8.02	Emergency exits	Emergency exits shall be provided to meet requirements of the Vehicle Directive and certification, as described in the body of the Contract.	***I***			

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9.00	**Open Platform**					
9.01	Open platform	Two options shall be considered: **i) Stowable bodywork with door:** A rear open platform in the rear nearside corner with stowable bodywork which is capable of closing off the platform so it can no longer to be used as a open platform. The stowable bodywork shall include within it an opening section which shall function as a power-operated service door. The operation to close off the open platform shall be capable of being undertaken within 5 minutes or less by the use of either one or two crew members. No special tools should be necessary for this operation which must also be capable of being undertaken away from the garage or depot. The stowable bodywork shall be capable of remaining open (ie stowed) whilst the Vehicle is in motion. No emergency release required. When stowed the bodywork shall be fully and completely out of sight of passengers and its enclosures should be integral with the interior and exterior fixed bodywork. **ii) Stowable bodywork without door:** A rear open platform in the rear nearside corner with stowable bodywork which is capable of closing off the platform so it can no longer to be used as a open platform. This operation shall be capable of being undertaken within 5 minutes or less by the use of either one or two crew members. No special tools should be necessary for this operation which must also be capable of being undertaken away from the garage or depot. When in the closed configuration it shall be evident to passengers that this area of the Vehicle is no longer an entrance or exit (both from the interior and exterior of the Vehicle). The stowable bodywork shall be capable of remaining open (ie stowed) whilst the Vehicle is in motion. No emergency release required. When stowed the bodywork shall be fully and completely out of sight of passengers and its enclosures should be integral with the interior and exterior fixed bodywork. Under both these options the Contractor must have regard to the Vehicle Directive, certification and operational requirements. A permanently open platform is not acceptable. When in the open configuration, the open platform could include part of the rear face of the Vehicle extending round from the rear near side corner.	***M***			
9.02	Additonal safety features	The Contractor may propose additonal safety features that could enhance the safe operation of the open rear platform when in the open mode.	***D***			

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10.00	**Staircase**					
10.01	Number of staircases	The Vehicle shall be designed with one staircase. Options showing more than one staircase will be considered, providing overall space utilisation requirements and dimensional constraints are complied with.	***M***			
10.02	Orientation of staircase	Rearward or forward ascending staircases (including a turning staircase) will be considered. If a turning staircase is to be proposed due consideration must be given to step heights and depths especially on the inner edge of any turning steps. Adequate landing and "passing" space should be provided.	***I***			

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11.00	**Body structure**					
11.01	Driver's cab	The Vehicle shall be designed so that the driver's cab is not completely separated from the passenger saloon. Driver/passenger interaction must be possible when the Vehicle is operating in one-person mode. For other features, see Specification 12.00. The ergonomics of the cab layout shall be developed during the detailed design stage and in collaboration with representative of the Vehicle Operators (see Specification 12.00). It is not envisaged that there will be any Vehicle Operator customisation or options.	***M***			
11.02	2nd crew accommodation	Within the rear open platform area, provision must be made for the 2nd crew member to stand to supervise boarding and alighting without obstructing the passenger flow. No seat is required although a secure locker facility shall be provided. The Contractor shall provide appropriate accommodation which allows the 2nd crew member to undertake their primary role of supervising the boarding and alighting of passengers and to consider appropriate normal and emergency communication system (including provision of a 2nd crew member's panic alarm) between the 2nd crew member and the driver.	***M***			
11.03	Glazing and windows	The Vehicle shall be designed with bonded glazing, with sacrificial film or appropriate anti-scratch/anti-graffiti window protection. Tinted side windows of at least 4mm are required achieving □ Solar energy transmittance of not more than 65% □ Light transmittance of not more than 80% Hopper windows for ventilation are not mandatory. Adequate ventilation and airflow must be provided and demonstrated by the ventilation and cooling system (see Specification 13.00)	***M***			
11.04	Insulation	Full bodywork insulation to sides, roof, front and rear where feasible is required to improve heat retention in winter and solar reflection in summer. The floor and supporting bulkheads between the engine and passenger area are to be well insulated against noise and heat intrusion. Insulation is to be provided against noise ingress, covering the total area from a point forward of the rear axle extending to the engine bulkhead insulation.	***M***			

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12.00	**Driver's cab interior layout and features**					
12.01	Functional requirements	The driver's cab shall provide a safe and comfortable workplace to enable the driver to operate the bus. Thus includes all driving duties and passenger interaction functions in both one- and two-person crewed modes. Ticketing, fare validation and cash collection facilities shall be provided. Access to driver's cab shall be from within the lower saloon. Consultation will be required with representatives of the Vehicle Operators on the final cab layout. There will be no Vehicle Operator options or customisation of the cab layout.	***M***			
12.02	Layout	The layout shall integrate all the necessary equipment into the cab dashboard and interior bodywork including the iBus equipment ticket and fare validation equipment and CCTV screen(s). The Contractor shall validate the ergonomic of the layout in consultation with representatives of the Vehicle Operators.	***M***			
12.03	Instrumentation	The Vehicle shall be provided with the necessary instrumentation and control equipment as required to operate, monitor and manage the Vehicle systems. Nearside mirror(s) to be designed to support observation of the rear open platform	***M***			

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12.04	Equipment	The driver's cab shall be provided with the following equipment: a) A cab air conditioning system which can be manually controlled by the driver b) Driver's anti-vandal screen is to be provided utilising a Polycarbonate "Marguard" type material. The screen should be suitably mounted to fully protect the driver from assault with particular attention given to the door security and area between door to front screen. The screen must be rattle proof and must not cause any interference with or distraction to the driver's duties. c) Driver must be further protected by an independent "siren / common network fleet sound" assault alarm also activating the vehicle hazard lights d) Driver operated PA system, "for passenger communication" will be provided as part of the iBus system (see Specification 16.01). e) The driver's seat shall be fully fit for purpose. The final size, shape and design shall be subject to consultation with representatives of the Vehicle Operators. f) Ticketing, fare validation and cash collection equipment shall be installed.	***M***			
12.05	Cab/Signal Window	A sliding driver's signalling window shall be provided on the offside. The window shall be constructed of suitable "Bandit glass" to provide protection to the driver from external attack.	***M***			

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13.00	**Heating ventilation, cooling**					
13.01	Heating, ventilation and cooling - general	The Vehicle shall include fully automatic heating, ventilation and cooling system which provides a comfortable ambient temperature for passengers in summer and winter conditions. The operating targets are set out below in Specification 13.02. The performance shall be based on a closed open platform configuration and the Contractor is expected to consider how systems should adjust to cope during open platform operation.	***M***			

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13.02	Heating, ventilation and cooling - performance	Heating system on/off settings: On <=17˚c, thermostat on gradual shut down within –ve 4˚c Off >17˚c Ventilation system on/off settings: On >17˚c via heating system blowers only running with ambient fresh air Off >21˚c with nominal air flow maintained to support forced air ventilation or air cooling. Adequate fresh air intakes shall be provided. Forced air Ventilation (Upper Deck Only) Off <21˚c Off >24˚c when air cooling also fitted On >21˚c, thermostat on 3 speed extraction • 50% >21˚c • 75% >22˚c • 100% >23˚c Air Cooling (Upper Deck Only) Off <24˚c On >24˚c □ Blown air ducted heating and ventilation system to both lower and upper deck. The ducting should provide a good and even circulation of air throughout the length of the bus interior. □ Convection only systems are not acceptable. □ Fully automatic thermostatic control of the system is required. The thermostatic sensors should be positioned to reflect the interior, upper and/or lower deck temperature of the Vehicle and be in a tamper proof location. □ Heated or unheated fresh / exterior air should be circulated throughout the Vehicle dependant on interior Vehicle temperature □ It shall not be necessary for the driver, maintenance teams or any other parties to adjust or set the system during variations of temperature over the summer and winter periods □ If engine bay “maintenance only” shut-off valves are required, they must utilise an independent hand tool and not be capable of being adjusted by lever or hand operation.	***M***			
13.03	Additional requirements for the upper saloon	In addition, the Vehicle shall include: a) Upper saloon ventilation system that extracts air from the saloon to increase air changes up to 120 per hour at maximum speed and set at 2 or 3 temperature settings b) Upper saloon air cooling system shall be able to reduce the internal temperature by 4C when subject to an interior temperature of 30C by inputting conditioned and cooled air.				
13.04	Air conditioning	Not required in passenger saloons.	***D***			

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14.00	**Passenger information systems**					
14.01	iBus	The Contractor shall fit the Company's proprietary iBus information system. This equipment will be supplied free of charge. Enhanced information systems or equipment may be proposed. Details of the technical specification of the iBus equipment is available on request.	*I*			
15.00	**Ticketing systems**					
15.01	Ticketing systems	The Contractor shall fit the Company's ticketing and fare validation equipment. This equipment will be provided free of charge. Details of the technical specification of the iBus equipment is available on request.	*I*			

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16.00	**Communications, CCTV**					
16.01	Communications	The Vehicle shall be provided with a passenger announcement communication system that can be operated by either the driver or the 2nd crew member. This equipment will be part of the iBus equipment provided free of charge. The Vehicle shall be provided with PA speakers for the announcement system which shall be discretely integrated into the interior bodywork, but which shall be designed to be easily maintained or replaced. The communication system shall also enable the driver and/or the 2nd crew member to communicate with the Company's operations control centre. The Vehicle shall be provided with the driver/2nd crew member intercommunication system which shall also incorporate a signalling device for operational instructions as required.	***M***			

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16.02	CCTV recording equipment	The Vehicle shall incorporate the following CCTV recording and capture equipment: **Digital Colour Recorder** • Minimum 80Gb hard disc capacity with ability to increase up to 120Gb on request • Capable of utilising up to a minimum of 12 cameras dependent upon vehicle type • Audio option • Minimum recording rate of 25 images per second and set for not less than 4 images per second per camera in recording mode • System capable of operating and reviewing on Windows 98, ME, 2000, XP and USB links • GPS and GPRS compatibility • LAN/WLAN compatibility • Shock and vibration protection package • Easily removable hard disc for external monitoring • 24 hour clock with automatic time adjustment and date identification • Watermarked security recordings • Mounted in lockable, shock proof, vandal resistant protective enclosure at concealed position within the vehicle • Unit easily detachable from within enclosure • Fully smoothed and conditioned independent power supply • Default Camera Settings may be utilised to avoid unnecessary use of disc storage capacity or provide alternative camera use • Unit and installation fully EMC tested In addition, the recording equipment shall be capable of recording the following Vehicle data information: • Vehicle road speed, foot brake application and traffic indicator “left and right” recorded with date, time and position □ Position, speed, date and time data suitable for mapping The CCTV recording systems shall be capable of interfacing with the iBus system.	***M***			

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16.03	CCTV camera equipment	The Vehicle shall incorporate the following CCTV capture equipment: **Digital Colour Cameras** • Combination of wide and standard angle lenses to improve vision coverage • Housed in vandal resistant dome or concealed. Housings shall be fully integrated into interior bodywork **Camera coverage and positions shall be suitable to monitor the following areas:** i) Entrance / exit areas and passenger / driver Interface ii) Wheelchair space and deployed ramp area iii) Two cameras at rear of upper saloon interior seated area looking forwards covering a minimum of the rearmost seating area and last four rows of seats. iv) Lower saloon between the centre door and the rear of the vehicle which may be mounted either at the rear looking forwards or at the centre door looking rearwards. v) Top of stairwell looking downwards. vi) Front of upper saloon interior seated area looking rearwards. vii) Forward facing to road ahead of vehicle. vii) Interior Drivers Cab looking towards Drivers Signalling Window viii) Coverage of the rear open platform area, and the immediate area external to the vehicle to the side and rear of the vehicle.	***M***			
16.04	CCTV monitoring equipment in driver's cab	The Vehicle shall incorporate the following CCTV monitoring equipment in the driver's cab: **Driver's cab colour 15cm flat panel monitor.** • Suitably mounted in drivers cab area • Monitor to display radio-adjusted time clock • Default setting to show rear open platform area, central door area and ramp deployed area when exit bell push or centre door open requested **Low bridge data integrated into CCTV system** • Warnings displayed on drivers cab monitor • Recording of low bridge warning recorded on hard disc for reference	***M***			

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16.05	CCTV monitoring equipment in passenger saloon	The Vehicle shall be provided with the following CCTV monitoring equipment in the passenger saloon: **Passenger colour 38cm flat panel monitor** • Suitably and securely mounted behind vandal resistant protection screen in the optional positions of □ Rearward exit door partition, facing forwards □ Staircase to aisle fascia lower saloon □ Front interior dome upper saloon is strictly prohibited • Monitor to display radio-adjusted time clock • Monitor to display continuously a 5 second sequence of all individual interior cameras and end with an all camera view	***M***			

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17.00	**Destination equipment**					
17.01	Destination displays	The Contractor shall provide route and destination equipment as described below. Route number and destination wording and information relevant to particular routes will be provided in due course during the production phase: • Power operated front, side, rear platform and rear displays with route selection unit in drivers cab simultaneously controlling all displays. □ All displays in Transport for London's Classic Johnston bold font □ All displays in day-glow yellow font on black background including out of service or any other passenger information □ All displays to be suitably and fully back-illuminated using an LED-type lighting system, positioned at horizontal centreline of each blind. □ No light illumination gaps should be visible around any point on the displays from the exterior view of the bus. □ Blind jockey rollers or other devices must be utilised when necessary to keep blinds tort and as close as possible to the glazing line □ All displays to have exterior anti vandal impact and anti reflection overlay □ Front destination identification to be viewable from the drivers cab • Front route and ultimate destination only, to be side by side arrangement. Independent single track number to the near side. □ Front route number to be no smaller than 450mm x 330mm □ Ultimate destination sight size of not less than 1160mm width and 330mm height • Near-side and rear platform route and intermediate destinations only, to be side by side arrangement. Route number to the forward most point of display □ Intermediate destination sight size of not less than 687mm width and 210mm height □ Route number to utilise full depth available from display height, sight size of not less than 270mm width and 210mm height • Rear Route Number to be identical or no smaller than the independent front route number Electronic displays are not acceptable. Options for destination blinds plus route number at front, rear, side and rear nearside corner may be proposed.	***M***			

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18.00	**Livery, colour schemes, trim, labels, notices, branding etc**					
18.01	General	The Vehicle shall have unique and iconic styling both externally and internally. There shall be an overall common styling theme that pervades all key features of the Vehicle. Contractors will be provided royalty free (for the purposes of the tender exercise) with all of the winning design submissions that were part of the Company's Design Competition run in 2008. Contractors are encouraged to fully utilise this resource in their proposals, and this data forms part of Company's "Background Intellectual Property" for the purposes of the Contract. This material is provided in Section 6 of the Invitation to Negotiate. The final proposal for the essential "look and feel" of the Vehicle is not expected to have been completed during the Bidding stage.	***M***			
18.01	External colour	All Vehicles shall be painted in a livery that is fully London Buses red, reference ICI P498FPF3, or exact colour equivalent with the following exemptions □ White roof panels. These must not visible from pavement level. □ Road wheels are unpainted	***M***			
18.02	Internal colours & trims	Colours & trims to blend with overall styling and to be unique to this Vehicle. No operator options or customisation will be allowed. The final design for the proposed internal colours and trims is not required to be submitted during the Bidding stage	***M***			

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18.03	Seating moquette	The Contractor shall design a new and unique seating moquette or seat covering material. No operator options or customisation will be allowed. The final design for the proposed seating moquette is not required to be submitted during the Bidding stage.	***M***			
18.04	Labels & notices	Statutory and general notices and labels to be provided in accordance with the certification requirements. Passenger notices and labels will be issued FOC (see section 28.00).	***M***			
18.05	Branding	There are restrictions on the Contractor's branding. Refer to the main body of the Contract for more information. Vehicle operator logos (vinyl overlays) will be allowed subject to approval by the Company.	***I***			
18.06	Advertising	External and internal advertising space to be provided	***M***			

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19.00	**Safety features & requirements**					
19.01	Safety - general	Over and above the Contractor's normal obligations with regard to health and safety matters, the Contractor shall investigate and propose a range of enhanced safety features for the operation of the Vehicle, and shall demonstrate these benefits by undertaking the necessary risk assessments.	***D***			
19.02	Materials	All materials used shall meet the fire retardancy requirement to achieve BS476 Class 1.	***M***			
19.03	Engine bay automatic fire suppression	The engine compartment shall incorporate a fully automatic fire suppression system, capable of extinguishing an engine bay fire before serious vehicle damage is sustained or passenger safety is compromised. The system should provide multi point dispensing, targeted at high-risk sections of the engine bay. Driver manual activation or override is not required. An audible warning on start-up shall be provided to alert the driver on the operational status of the system. Immediately prior to activation of the fire suppression system any fans in the protected engine bay area must be locked stationary and the engine shut down within 10 seconds. In addition the fuel system to the engine bay must be cut off ensuring no further fuel is supplied to the engine bay area and an effective isolation of the fuel tank supply is achieved. Driver audible warning of this shut down procedure is required.	***M***			
19.04	Smoke detectors	A concealed smoke detector shall be provided in the upper deck rear seated area. The detector shall be incorporated into the drivers audible information and warning device.	***M***			

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19.05	Emergency engine shutdown device	An engine emergency shut down device shall be fitted and it must be accessible without the need to open the main engine bay cover. It must also be of a type that allows the engine to be restarted from the driver's cab, provided the main rear engine bay cover is closed.	***M***			
19.06	Wheel arch blow out liners	All wheel arches shall be fitted with tyre blow out protection liners.	***M***			
19.07	Anti-slip floor covering	The vehicle shall be provided with an anti-slip floor covering with joints minimised. Notwithstanding the requirements given in Specification 18.00 colour contrasting step nosing shall be used be used on all step edges in accordance with the PSVAR.	***M***			
19.08	Crash and impact resistance	The Contractor shall design the Vehicle with adequate crash and impact resistance, and shall also design the Vehicle in such as way as to minimise the risk of serious injury to pedestrians in the event of a frontal collision. In particular the front near-side corner of the upper deck shall incorporate a discrete tree guard, giving additional forward protection to the front seated passengers, exterior dome and near side corner window-pillar.	***M***			

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20.00	**Repair and Maintenance**					
20.01	General	The Vehicle shall be designed to be easily maintained during both routine preventative and corrective maintenance cycles. In addition, due consideration must be given to facilitate accident damage and both major and minor repairs. The Vehicle shall be designed to have a very high operational availability taking into account the requirements of the maintenance regime. The Contractor shall state and justify a typical spare Vehicle requirement for a peak Vehicle requirement of 30 Vehicles (for a sample route).	***M***			
20.02	Cleaning	The Vehicle shall be designed for ease and speed of internal and external cleaning, with special attention paid to choice of materials and surface textures, as well as avoiding dust, liquid and material traps within the saloons. The Vehicle must also be capable of using standard double-deck bus wash equipment. The cleaning regime is to be specified (eg effort and frequency required for in-service and deep clean cycles). Cleaning costs to be incorporated into the whole-life estimates given in Specification 1.04	***M***			
20.03	Refurbishment	The Contractor shall include for a full refurbishment programme after 5 years. The Contractor shall detail the major items considered necessary for refurbishment after 5 years of operation to facilitate a further 5 years of reliable operation.	***M***			
20.04	Maintenance.	A full repair and maintenance programme (R&M) including effort, parts and frequency shall be provided. Costs shall be incorporated in the whole-life cost estimates in Specification 1.04. The R&M programme shall exclude accident damage and repair. An option proposal for a full R&M contract for 5 years is to be provided. Option to be based on similar volumes as given in the Pricing Table in Section 3 of the Invitation to Negotiate.	***M***			

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21.00	**Quality assurance**					
21.01	Documents, drawings layouts	**1. Bidding stage:** Sufficient general arrangement plans, drawings and technical documentation required to adequately describe the concepts and proposals being made and to allow evaluation to be undertaken. The pricing table in Section 3 of the Invitation to Negotiate shall be completed. No computer generated imagery, visuals or renderings shall be submitted as part of the tender submission, unless expressly requested by the Company at a later stage. ***Note:*** it is not expected that the Contractor will have completed the detailed design during the tender period. **2. Design and development stages:** General arrangements, plans, drawings and technical documentation are required at each milestone, as set out in Section 3 of the Invitation to Negotiate. **3. Production and delivery stages:** Full production, tooling and assembly plans are required. A full suite of technical documentation is to be provided for each variant produced during the life of the production run. Two hard copies and one electronic copy to be provided for each document produced. Key assumptions and target outputs (eg weight, performance, economy, capacity, emissions etc) to be produced for each of the steps identified in the design and development phase.	***M***			

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21.02	Quality plan	A product quality assurance plan is required for the design and development stage, and production and delivery stage.	***M***			
21.03	Stage approvals	The Contractor shall propose key stages and milestones during the design and development stages which will require the Company's approval before authority is given to proceed to the next stage. The milestone schedule is set out in Section 3 of the Invitation to Negotiate.	***M***			
21.04	Vehicle manuals	Full Vehicle manuals (owner, driver, conductor, maintenance etc) to accompany each Vehicle. Manuals must be provided in hard and electronic copy.	***M***			
21.05	Training	The Contractor shall propose develop and deliver appropriate training regimes for drivers, conductors and maintenance staff. Computer based training materials and methods may be proposed.	***M***			

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22.00	**Pre-production vehicles**					
22.01	Mock-up	A full scale, full size static mock-up shall be constructed which is capable of being used for both stakeholder input plus passenger flow analysis. The mock-up shall include both the lower and upper deck and the interconnecting staircase(s). The mock-up shall be capable of being moved to one site within the Greater London area as specified by the Company for wider stakeholder engagement. The cost of movement assembly and dismantling shall be included within contract. Other partial mock-ups including virtual CGI visualisations and simulations may be proposed.	***M***			
22.02	Proving Vehicle	The Contractor shall construct at least one proving Vehicle for engineering test and endurance purposes. This Vehicle is not required to be tested or trialled in commercial service.	***M***			
22.03	Prototype Vehicle	The requirements for production, testing and supply of a Prototype Vehicle are covered in the body of the Contract	***M***			
23.00	**Testing**					
23.01	Testing	The Prototype Vehicle shall be subjected to the full range of TfL and legal testing to ensure it complies with all TfL specifications and durability, and that pre- and production Vehicles will meet all legal and operational requirements.	***M***			

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24.00	**Inspections**					
24.01	Inspections	A full inspection by any sub-suppliers necessary to enable guarantee provisions must take place with each Vehicle on completion. The following documentation shall be provided for each Vehicle: - Unladen weight certificate is required for the groups of Vehicles, showing front axle, rear axle and total weights. - A laden weight calculation by axle and total is required for the group of Vehicles. - A Vehicle checklist and conformity inspection sign-off completed by the Company must take place with each Vehicle on completion. All documentation must be signed, name / position printed, dated and Vehicle identified by registration number. Each Vehicle may be inspected at any time by the Company's nominated staff and signed as conforming to specification prior to delivery. Regular progress / quality meeting will be held and documented, at the request of either party, throughout the build process.	***M***			
25.00	**Certifications**					
25.01	Vehicle certification	The Contractor shall be responsible for certification of the Vehicle with the appropriate agency. This requirement is covered in the body of the Contract.	***M***			

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26.00	**Manufacturer's warranties**					
26.01	Manufacturer's warranties	The Contractor shall declare the warranties to be provided for the following equipment, sub-assemblies and components, where appropriate: a) General Under Frame b) Engine c) Engine Auxiliary Components d) Hybrid system major components (eg power storage system, generator motor, drive motor, power control systems) e) Transmission f) Full Drive Line g) Under Frame Structural Integrity h) Under Frame Corrosion i) Body Frame Structural Integrity j) Body Frame Corrosion k) General Body Frame l) Ramp Equipment m) Interior Lighting n) Floor Covering o) Floor Boards p) Door Systems q) Destination Equipment r) Exterior Paint Colour Retention	***M***			

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27.00	**Pre-delivery**					
27.01	Valet	Every Vehicle shall undergo a full interior valet and external wash and polish prior to presentation for acceptance.	***M***			
27.02	Factory acceptance	Factory acceptance is required by the Company for each Vehicle. This requirement is covered within the body of the Contract.	***M***			
27.03	Delivery	Delivery to a site specified by the Company within Greater London is covered within the body of the Contract.	***M***			
28.00	**Schedule of Free of Charge (FOC) items**					
28.00	iBus	All equipment related to the iBus system	***I***			
28.01	Ticketing equipment	All equipment related to ticketing and fare validation equipment including remote Oyster card readers	***I***			
28.02	Notices	All passenger related interior notices, labels and signs, as well as relevant logos and notices for the exterior	***I***			

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29.00	**Glossary of terms**					
	DDA	Disability Discrimination Act 2005				
	PSV	Public Service Vehicle				
	PSVAR	Public Service Vehicle Accessibility Regulations 2000				
	Bus Directive or Vehicle Directive	European Directive UN ECE Regulation 107.02				
	Priority Seat	A seat with additional space for a passenger with reduced mobility and marked accordingly, as defined in the Bus Directive.				
	TfL	Transport for London, a functional body of the GLA, accountable to the Mayor, with responsibility for delivering an integrated and sustainable transport strategy for London.				
	TfL MLTB Test Cycle	Transport for London Millbrook London Transport Buses Test Cycle - a defined driving cycle against which comparisons of a number of performance parameters can be determined.				
	iBus	A proprietary integrated information and communication system for buses developed by Transport for London.				
	CCTV	Closed Circuit Television				
	LED	Light emitting diode				
	FOC	Free of Charge				
	PA	Public address or public announcement				
	Oyster	The brand name of the Transport for London pre-payment card system for ticketing				
	ELV	End of Life Vehicle Directive				
	CO2	Carbon dioxide				
	HC	Hydrocarbons				
	CO	Carbon monoxide				
	NOx	Oxides of nitrogen				
	PM	Particular matter				
	dB(A)	The unit of measure of sound pressure level on a log scale - A-weighting scale				
	Lux	The unit of measure of luminance				
	CGI	Computer generated imagery				